

New electrolytes for lithium-sulfur battery

U.S. DEPARTMENT OF

ENERGY

Energy Efficiency &
Renewable Energy

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- **Objective:** Develop new electrolytes, additives and electrode compositions for Li-S battery with high ion conductivity, stable towards polysulfide, and promoting the polysulfide affiliation with the electrode substrate to prevent polysulfide dissolution.

Impact:

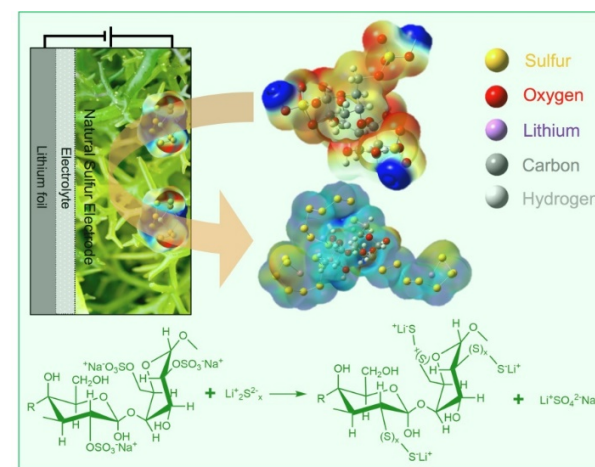
- Li-S batteries could be both high energy density and low cost.
- To develop new approaches for electrolytes and electrode compositions of Li-S rechargeable batteries.

Accomplishments:

- Developed new organic electrode and binder approach to stabilized dissolved polysulfide
- Identified new binder materials that can facilitate nucleophilic substitution between polysulfides and Binders
- Applied this concept to develop new composite electrode materials and explore new electrolyte.

This project was a new start in Aug 2018.

A reactive binder towards polysulfides in the presents of electrolyte stabilizes sulfur electrode



FY19 Milestones:

- Generate 2D sulfur deposition substrates. (Q1)
- Perform electrochemical deposition of sulfur species. (Q2)
- Investigate the overpotentials differences. (Q3)
- Demonstrate the effect of surface functional groups and electrolyte impact to the sulfur deposition. (Q4)

FY19 Deliverables: The Li-S electrode based on this optimization should have high sulfur utilization above 1600 mAh/g.

Funding:

— FY19: \$450K, FY18: \$450K, FY17: 0